CLAIMS

1. A method of producing a microstructured optical fibre from a preform, said method including the steps of:

creating zones of relatively high refractive index at predetermined locations in said preform, said zones substantially surrounded by material of relatively low refractive index to create an array of light guiding cores, and

subsequently drawing said preform to create a length of said microstructured optical fibre.

2. The method as claimed in claim 1 wherein said light guiding cores are surrounded substantially by air.

3. The method as claimed in claim 1 or 2 wherein said light guiding cores have a generally non-circular cross-sectional shape.

4. The method as claimed in any one of claims 1 to 3 wherein said preform is formed from optically suitable polymeric material.

5. The method as claimed in any one of claims 1 to 3 wherein a plurality of holes is drilled into said preform at said predetermined locations.

6. The method as claimed in any one of claims 1 to 5 wherein said preform is drawn to form said microstructured optical fibre in a two-stage drawing process.

7. A method of producing a microstructured optical fibre from a preform, said method including the steps of:

creating channels of relatively low refractive index at predetermined locations in said preform, said channels acting to define light guiding cores, and

subsequently drawing said preform to create a length of said microstructured optical fibre.

8. The method as claimed in claim 7 wherein a plurality of holes is drilled into said preform at said predetermined locations to create said channels.

9. The method as claimed in claim 7 or 8 wherein said preform is drawn to form said microstructured optical fibre in a two-stage drawing process.

10. The method as claimed in any one of claims 7 to 9 wherein said preform is monolithic.

11. A micro-structured optical fibre, said optical fibre including a plurality of air channels, said air channels acting to define light guiding cores between said air channels.

12. A micro-structured optical fibre for imaging applications, said optical fibre including air channels which act as light guiding cores.

11. A micro-structured optical fibre, said optical fibre including a plurality of air channels, said air channels acting to define light guiding cores between said air channels.

12. A micro-structured optical fibre for imaging applications, said optical fibre including air channels which act as light guiding cores.

11. A micro-structured optical fibre, said optical fibre including a plurality of air channels, said air channels acting to define light guiding cores between said air channels.

12. A micro-structured optical fibre for imaging applications, said optical fibre including air channels which act as light guiding cores.

11. A micro-structured optical fibre, said optical fibre including a plurality of air channels, said air channels acting to define light guiding cores between said air channels.

12. A micro-structured optical fibre for imaging applications, said optical fibre including air channels which act as light guiding cores.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/001639

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: C03B 37/075, G02B 6/00

According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT and JAPIO with keywords: holey, photonic crystal, microstructure, fiber, fibre, waveguide, preform, mold, cast, pmma, array, multiple, plural, matrix, grid, core, guide, capillary, channel

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	van Eijkelenborg, Martijn A. et al. - Recent Progress In Microstructured Polymer Optical Fibre Fabrication And Characterisation, Optical Fiber Technology Volume 9, Issue 4, (October 2003) 199-209, see page 206 and figure 5	1 – 6, 11
X	WO 2003 / 009026 A1 (UNIVERSITY OF SYDNEY) 30 January 2003 See figures 2a – 2d	12
P, X	US 2004 / 0151454 A1 (FAJARDO et al.) 5 August 2004 See the abstract and figure 3	11, 12

☐ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 February 2005	07 MAR 2005
Name and mailing address of the ISA/AU	Authorised officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	**ROSS BURDON** Telephone No : (02) 6283 2605

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/001639

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: **7 to 10**
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Refer to the supplementary sheet.

3. ☐ Claims Nos :
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Refer to the supplementary sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos :

4. ☐ No required additional search fees were timely paid by the applicant Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No
PCT/AU2004/001639

Supplemental Box
(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: II

Independent claim 7 and its dependent claims 8 to 10 are of indeterminate scope These are not clear because the feature that the channels act to 'define light guiding cores' fails to distinguish whether this definition of the light guiding cores is such that they are thus formed of the relatively low-refractive-index material or of the remaining high-refractive-index material. If the possibility exists that the cores may be of either material, then that too is not clear.

Continuation of Box No: III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1 to 6 and 11 are directed towards a microstructured optical fibre that comprises a plurality of guiding cores of high refractive index material. It is considered that a plurality of guiding cores of high-refractive-index material comprises a first "special technical feature".

2. Claim 12 is directed towards a microstructured optical fibre with a plurality of air channels (a low-refractive index material) acting as guiding cores. It is considered that a plurality of air channels as guiding cores comprises a second special technical feature.

I note that claims 7 to 10 are neither clearly associated with just one of these groups nor comprise a clearly distinct group. These claims are objected to at Box II and are not considered further.

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/AU2004/001639

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	2004151454	WO	2004070444
WO	2003009026		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX